

U.S. National/Naval Ice Center

Sea Ice Products and Services



USN USCG NOAA

CDR Kelly Taylor
Commanding Officer

LCDR Robert Atkinson
Executive Officer

Mr. Sean Helfrich
(Acting) Deputy Director



U.S. National/Naval Ice Center

Mission

The U.S. National Ice Center (NIC) is a tri-agency partnership of the United States Navy (USN), the National Oceanic and Atmospheric Administration (NOAA), and the United States Coast Guard (USCG) providing global ice and snow analysis and short term forecasting services for the maximum benefit of the United States government.

Vision

To be the U.S. government's authority on global sea ice and snow analysis and forecasting.

<u>Goals</u>

Goal 1. Develop Capabilities

Goal 2. Transition Science and Technology



Goal 3. Strengthen Partnerships

Goal 4. Professional Excellence



U.S. National Ice Center History

- 1976: Common requirements between Navy and NOAA resulted in the formation of the Navy/NOAA Joint Ice Center (JIC).
- 1995: USCG joined, JIC became the U.S. National/Naval Ice Center (NIC/NAVICE).
- NIC responsibilities established via Annex V under the MOA between DOC and DON.
 - Participating authorities
 - NOAA: 15 U.S.C. § 313, 15 U.S.C. § 2921 et seq., and 15 U.S.C. § 1525.
 - Navy: 10 U.S.C. § 5013.
 - USCG: 14 U.S.C. § 141.
- The NIC Executive Steering Committee consists of a representative from each organization (Navy, NOAA, USCG).

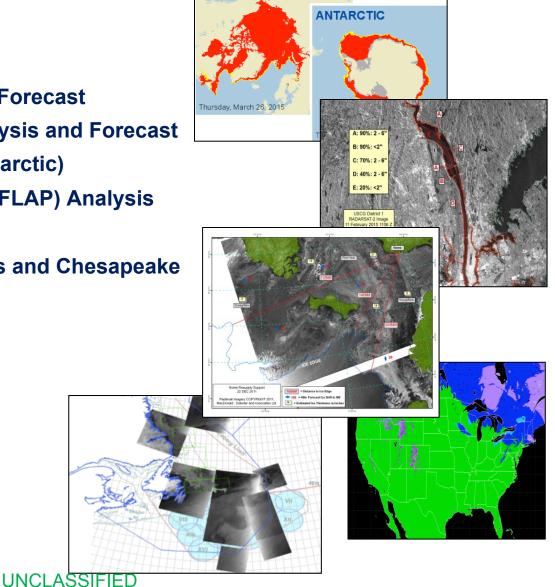
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Requirements: Navy, NOAA, USCG

ARCTIC

- Daily Sea Ice Edge Analysis and Forecast
- Daily Sea Ice Concentration Analysis and Forecast
- Daily Iceberg location (Arctic/Antarctic)
- Fractures, Leads, and Polynyas (FLAP) Analysis and Forecast
- CONUS Ice Analysis: Great Lakes and Chesapeake and Delaware Bays
- Climatological Outlooks
- Global Snow and Ice Monitoring
- Daily Imagery Analysis
- On-scene Ice Analyst





NIC & National Strategy

Navy, NOAA, Coast Guard

- Improve Awareness
- **Broaden Partnerships**

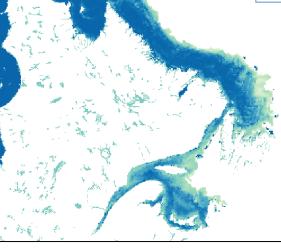
Strengthen Foundational

Science



Crew members and scientists from the US Coast Guard @ McKenzie Funk icebreaker Healy haul a buoy across the sea ice during a deployment. In the lead, BM3 Yeckley is on bear watch, followed by SN Hafner the rescue swimmer, Dr. Pablo Clemente-Colón (pulling), and Dr. Dale Chayes steadying the sled







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Domestic Partnerships

National Snow and Ice Data Center

- Archives NIC data
- Co-generates the Multi-sensor Analyzed Sea Ice Extent (MASIE) with NIC



- Algorithm testing and development
- NIC identified as early adopter for NASA SMAP mission

Office of Naval Research

- Programs to enhance understanding of ice
- Provide analyzed imagery to support research efforts

Naval Research Labs

- Evaluate the utility of new USN models
- Partner on projects for model development

Bureau of Ocean Energy Management

- Partner on projects for improved sea-ice forecasting

Rutgers University Global Snow Lab

Climate Data Record (CDR) using NIC Blended Snow

University of Washington – APL

Coordination for IABP (funding and deployment)















International Partnerships

- North American Ice Service (NAIS)
 - Multi-agency partnership between U.S. National Ice Center (NIC),
 Canadian Ice Service (CIS), and U.S.C.G. International Ice Patrol (IIP)



 Global participants working together to maintain a network of drifting buoys in the Arctic Ocean



- Promotes cooperation between the world's ice centers on all matters concerning sea ice and icebergs
- WMO Expert Team on Sea Ice (ETSI)
 - Formal coordination of sea ice activities on the level of WMO/IOC that provides technical direction to the WMO Secretariat
- WMO Global Cryosphere Watch SnowWatch
 - Promotes cooperation between the world's snow observing nations











North American Ice Service



SHARED RESOURCES

Imagery Savings est > \$1.6m/yr

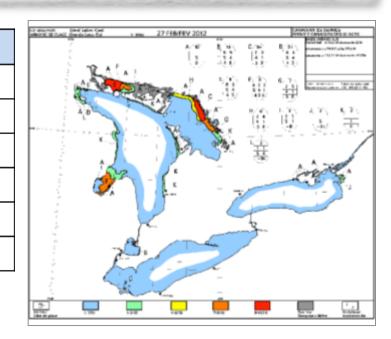
Man Hour Savings (NIC) est ≥ \$ 50k/yr

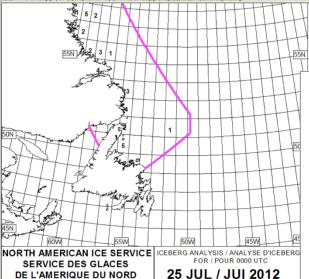
Local Expertise

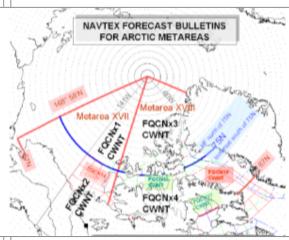
Flexibility to pursue new products

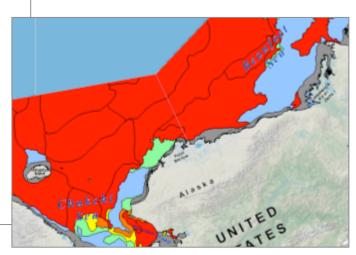
Support Joint Missions

Contingency for Critical Products









ICEBERG LIMIT / LIMITE DES ICEBERGS NOTE

CEBERG LIMIT / LIMITE DES ICEBERG:
SEA ICE LIMIT / LIMITE DES GLACES
LICEBERGS PER DEGREE SQUARE

ICEBERGS PER DEGREE SUDARE
ICEBERGS PAR DEGREE CARRE
RADAR TARGET OUTSIDE ICEBERG LIMIT
CIBLE RADAR A L'EXTERIEUR DE LA

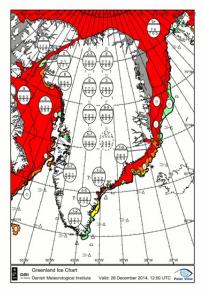
FOR MORE INFORMATION: POUR PLUS DE RENSEIGNEMENT:

WWW.NAVCEN.USCG.GOV/IIP WWW.ICE-GLACES.EC.GC.CA

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International Ice Charting Working Group



SHARED RESOURCES

Sea Ice Analysis GIS Files

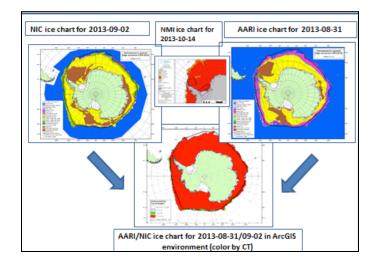
Man Hours

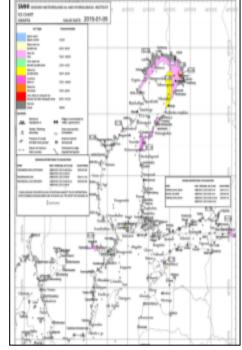
Local Expertise

Ice Reports

Imagery Savings

NIC, AARI and NMI are collaborating in Antarctic Analysis Harmonization



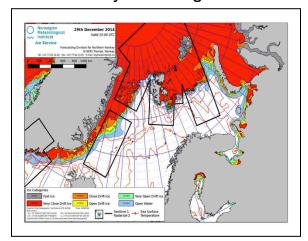


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Chile was the first Southern Hemisphere country to host the IICWG annual meeting in 2014,



In October 2014, Brazil was the first of the South American countries to send personnel for ice Analyst training at NIC.





Product Generation











Images



Arctic Maritime Domain Awareness









Buoys

Models Aircraft

Webcam

Radar

Ship Obs

Surface Obs

International **Partners**

Geographic Information System

Interpretive **Snow and Sea** Ice Analysis and Sea Ice **Forecasting**

Meteorology



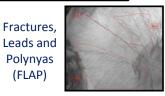
Semiautomation

Subject Matter **Expertise**

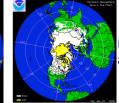








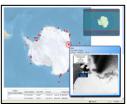
Automated Snow and Ice products

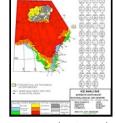


Blended Snow and ice cover

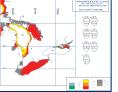








Ice Outlooks

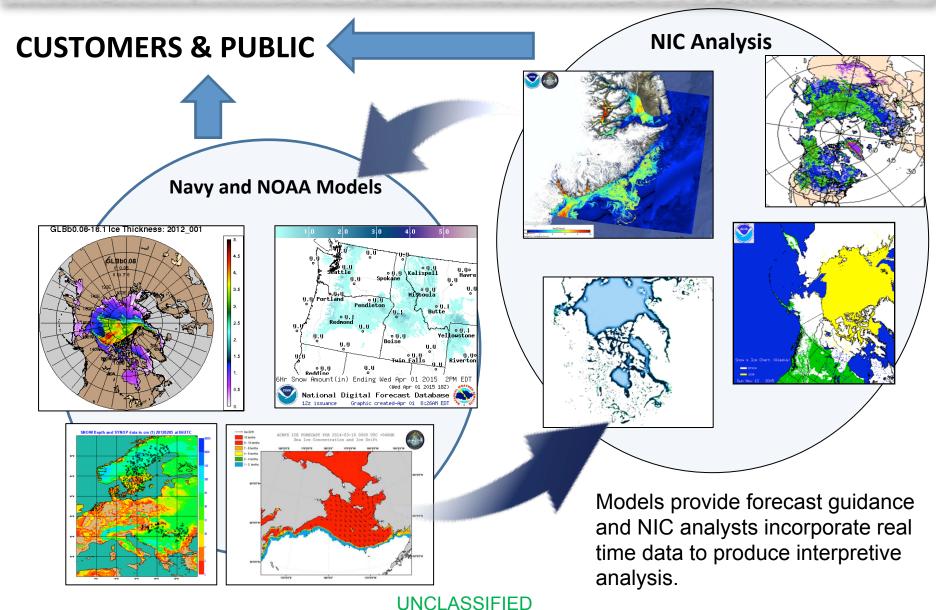


Blended Snow Depth

Hemispheric and Regional Ice Charts



Integration with Models





Arctic Cap Nowcast Forecast System



Mean Sea Level Pressure

Surface Air Temperature

Sea Surface Temperature

Sea Ice Fraction

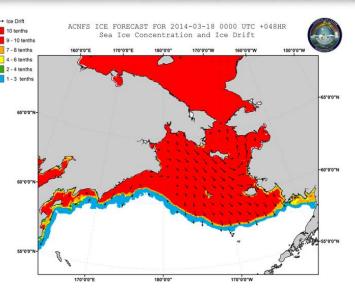
Sea Ice Thickness

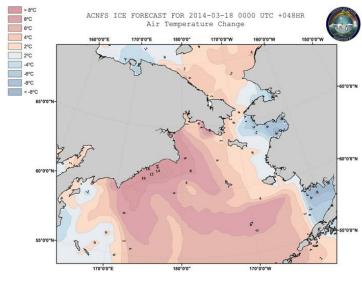
Ice Drift

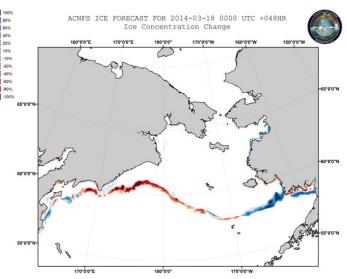
Lead Area Opening Rate

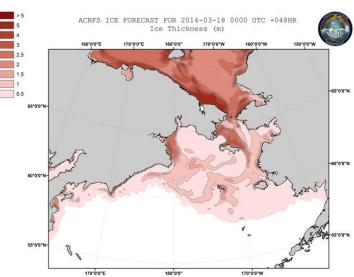
Sea Surface Salinity

Compressive Strength of Sea Ice



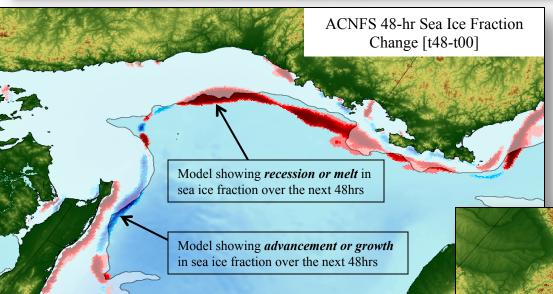








ACNFS derived product use at NIC

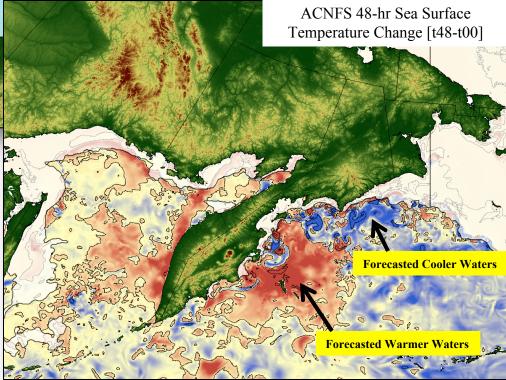


Change detection from ACNFS

- Produce 1-7 day difference fields
- Difference layers more precise and uniform

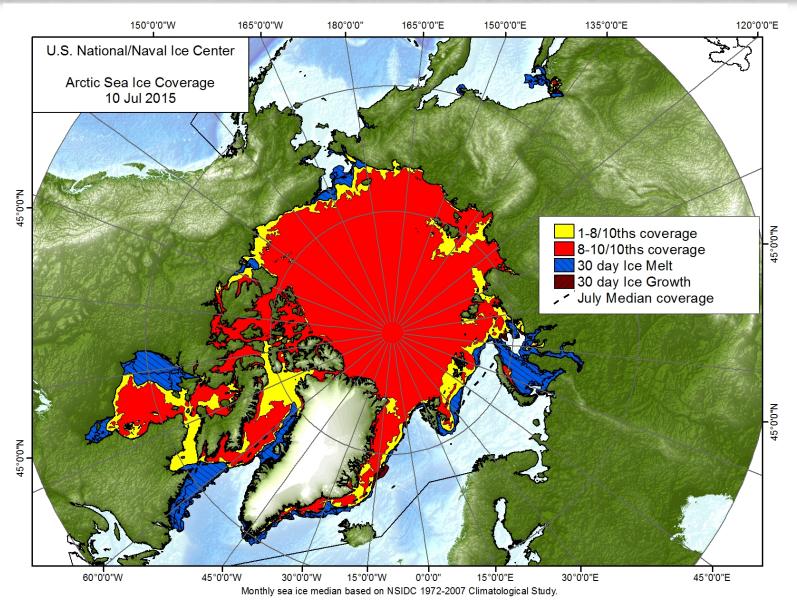
Can be difficult to mentally interpolate small differences

Less prone to interpretation errors



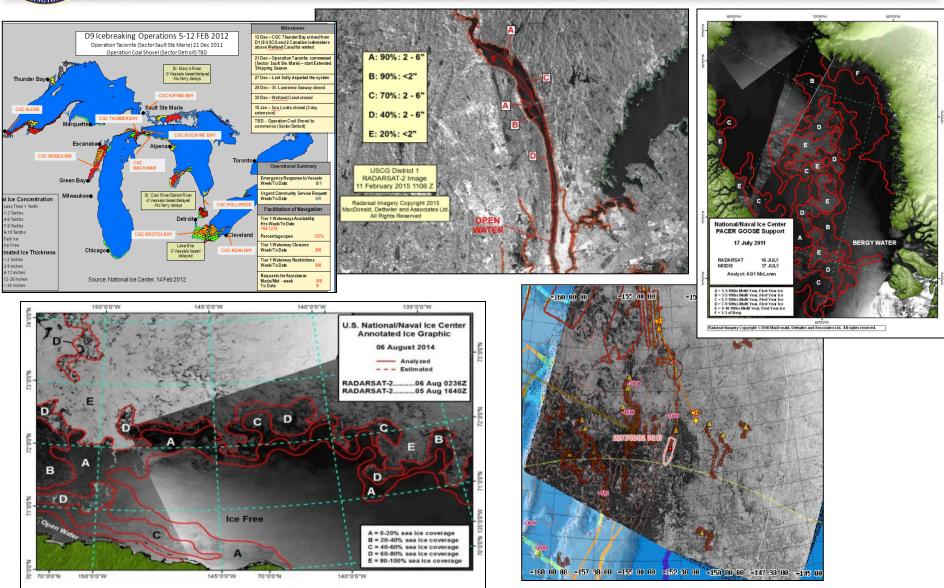


Arctic 30-day Change





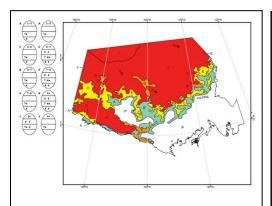
USNIC Tactical Support



RADARSAT-2 Imagery Copyright © 2014 MacDonald, Dettwiler and Associates LTD. All rights reserve



USNIC Routine Support



ICE ANALYSIS NATIONAL/NAVAL ICE CENTER Analysis Week 19 Jul 2010 Data Sources De

. . 168HR ANAL DRIFT VECTORS IN NAUTICAL MILES

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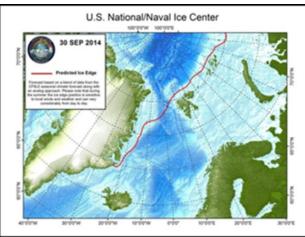
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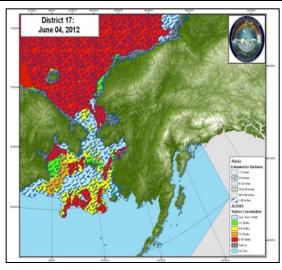
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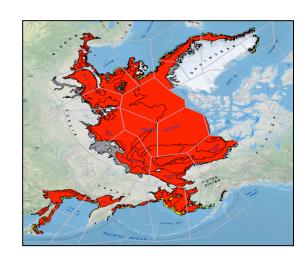
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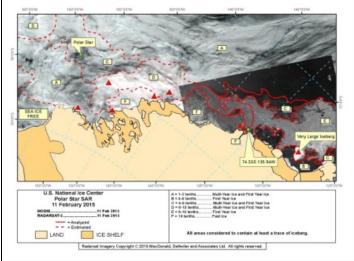




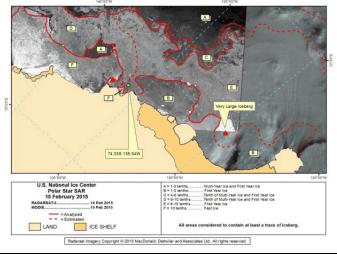


Mission Support – USCGC Polar Star





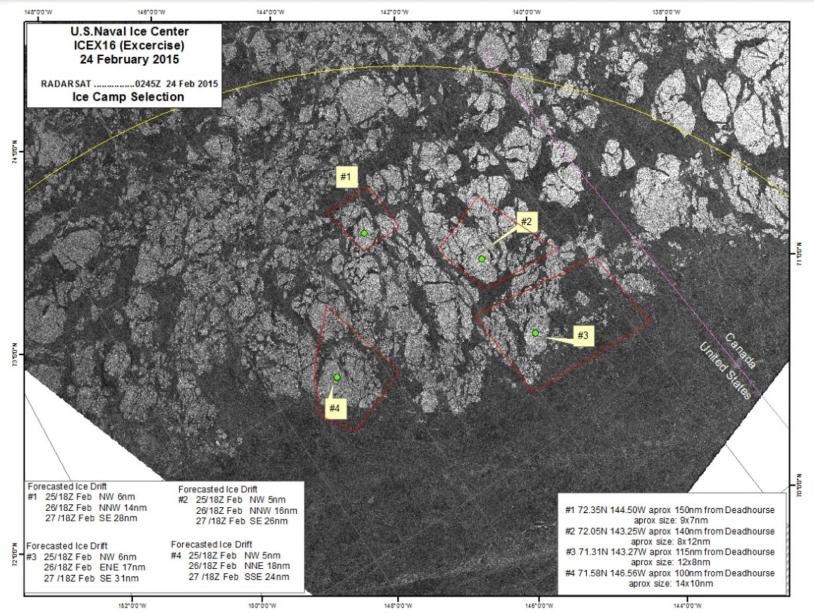




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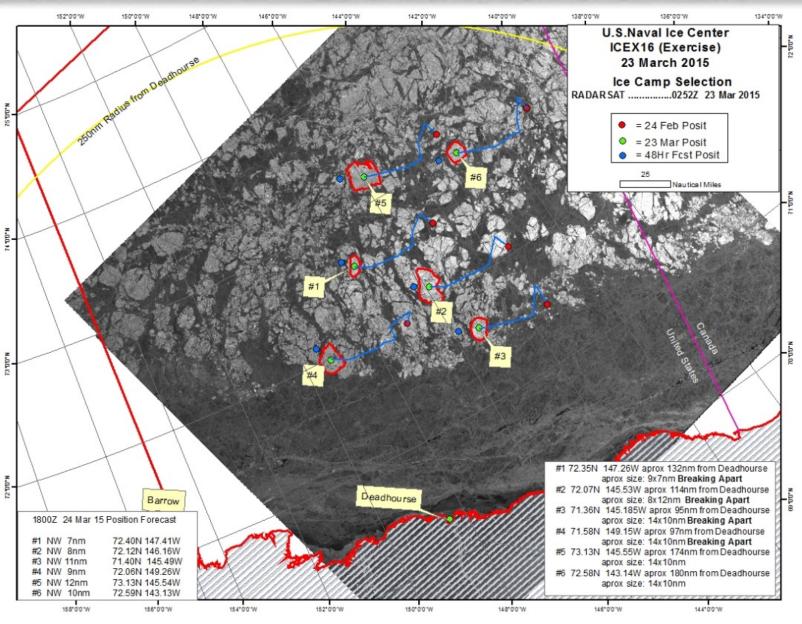


Mission Support - ICEX 2016 Preparation



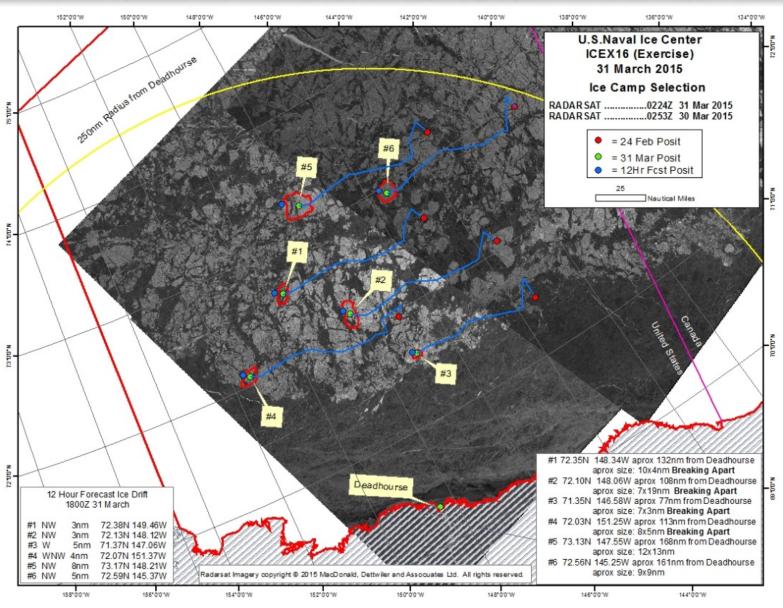
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Mission Support - ICEX 2016 Preparation



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Mission Support - ICEX 2016 Preparation





Questions

